

REQUEST TO AMEND THE LOS MEDANOS ENERGY CENTER (LMEC) 98-AFC-1 AMENDMENT REQUEST #7

AMENDMENT REQUEST

On March 6, 2003, the Los Medanos Energy Center, LLC (LMEC, LLC) filed a request to amend various Air Quality (AQ) Conditions of Certification to allow elevated nitrogen oxides (NOx) emissions during steam turbine cold start-ups and gas turbine combustor tuning periods for the Los Medanos Energy Center Project (LMEC). Specifically, LMEC, LLC requests the following modifications:

1. add new definitions for steam turbine cold startup and gas turbine combustor tuning activity periods,
2. insert language for steam turbine cold startup and gas turbine combustor tuning periods to AQ-21, 22(b), 23, 32, 33, 35 and 36 to ensure that the facility daily and annual emission limits remain unchanged,
3. increase emission limits for steam turbine cold start-ups and gas turbine combustor tuning periods to AQ-23,
4. limit combustor tuning to only one gas turbine at a time (AQ-24),
5. add new condition, AQ-25, to limit the number of hours of cold starts and combustor tuning to no more than 30 hours per calendar year (staff recommends incorporating the requested language into AQ-24 since there is an existing AQ-25 in the Commission Decision for LMEC),
6. add new condition AQ-38, which would add record keeping requirements for reporting cold startup and combustor tuning activities to ensure accurate reporting of the facility emissions (staff recommends adding a new condition, AQ-59, there is an existing AQ-38 Commission Decision for LMEC), and
7. insert language for steam turbine cold start-ups and gas turbine combustor tuning periods to AQ-44 for the record maintenance schedule.

LMEC, LLC proposes to maintain the facility daily and annual emission limits at the previously permitted level, therefore, no additional mitigation is proposed.

BACKGROUND

LMEC was licensed with two General Electric (GE) model 207FA gas turbine and heat recovery steam generator (HRSG) packages, two auxiliary boilers, a cooling tower and various support equipment. The facility has previously applied and received approval for several amendments, including: the use of recycled water for cooling, revisions to the natural gas pipeline route, increasing the size of the cooling tower, changes in fuel consumption limits, and the use of power augmentation to enhance the electrical output of the facility. The LMEC facility began operation in the spring of 2001.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

STATE

California State Health and Safety Code, section 41700, requires that: “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.”

LOCAL

Bay Area Air Quality Management District

The project’s modification is subject to those Bay Area Air Quality Management District (District) rules and regulations identified in the original project analysis.

STAFF ANALYSIS

Staff’s objectives in completing the air quality analysis for this amendment request are (1) to identify whether there is a potential for a significant air quality impact; and (2) to assure that appropriate mitigation measures have been applied to avoid or mitigate the identified potential air quality impacts.

Since its initial start-up and operation, LMEC has frequently exceeded the start-up and shut down nitrogen oxide (NOx) emission limits that were approved during licensing process. The District rules require that LMEC apply for a variance with the District for each exceedance. The District staff suggested that LMEC apply for a modification to increase the duration of cold start-up (up to 6 hours) and increase the turbines’ NOx start-up and shut down emission limits to avoid future variances.

In addition, LMEC, LLC has also learned that certain components of the gas turbines’ combustors will require periodic replacement, which necessitates a tuning process. During the tuning process, the NOx emissions control equipment operates at less than peak effectiveness, so there is an associated period of excess NOx emissions. The tuning process is expected to occur a few times per year.

LMEC, LLC requests that the maximum hourly NOx emissions limit during steam turbine cold start-ups or gas turbine combustor tuning periods be increased from 240 to 300 lbs/hr, not to exceed 600 lbs per event. Cold steam turbine start ups, those periods when the steam turbine has been inoperative for 72 hours or more, will occur only two or three times per year.

Because the facility's daily and annual emissions would not change, there will be no change in long-term air quality impacts is expected. However, short-term (one-hr) impacts for NOx need to be evaluated because start-ups, shut downs, and combustor tuning events are expected to increase NOx emissions.

LMEC, LLC has provided an analysis using an air quality model (ISCST3), which is approved by the District and the U.S. EPA, to assess the impacts due to the short-term increase of NOx emission during start-up and combustor tuning periods. The results of the modeling analysis are summarized in AIR QUALITY Table 1. The modeling results show that the project's new NOx impacts would not cause or contribute to any violations of the state and federal air quality standards for NOx ; therefore, the project short-term NOx emission impact due to the modification of the facility permit conditions is not significant.

**AIR QUALITY Table 1
Facility Emission Impacts**

Pollutant	Avg. Period	Impacts($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Total Impacts ($\mu\text{g}/\text{m}^3$)	California Standard ($\mu\text{g}/\text{m}^3$)	Percent of Standard
NO ₂	1-hour	160	164	324	470	69

Notes: All ambient air quality impacts have been modeled as the impacts caused by emissions during start-ups.

Source: LMEC March 6, 2003 Amendment Request.

CONCLUSIONS AND RECOMMENDATIONS

The request to increase the steam turbine start-up and gas turbine combustor tuning emissions would result in no significant impacts to the environment. Therefore, no additional mitigation is required.

Staff recommends approval of the LMEC, LLC amendment request. Specifically, staff recommends revisions to the Definitions Section of the Air Quality (AQ) Conditions and to AQ-21, AQ-22(b), AQ-23, AQ-24, AQ-32, AQ-33, AQ-35, AQ-36, and AQ-44. Staff also supports the addition of AQ-59 which adds new recordkeeping requirements applicable during steam turbine cold start-ups and gas turbine combustor tuning activities.

The specific revised Conditions of Certification are shown below in underline/ strikeout format. Underline indicates new language while strikeout indicates deleted language.

Revised Conditions of Certification

Definitions: Add the following definitions to the Definitions Section

Steam Turbine Cold Startup Period: The lesser of the first 360 minutes of continuous fuel flow to the gas turbine after fuel flow is initiated or the period of time from gas turbine fuel flow initiation until the gas turbine achieves two consecutive CEM data

points in compliance with the emission concentration limits of conditions 21(b) and 21(d), following a steam turbine shut down of at least 72 hours.

Combustor Tuning Activities: All testing, adjustment, tuning, and calibration activities recommended by the gas turbine manufacturer to insure safe and reliable steady state operation of the gas turbines following replacement of the combustor. This includes, but is not limited to, adjusting the amount of fuel distributed between the combustion turbine's staged fuel systems to simultaneously minimize NOx and CO production while minimizing combustor dynamics and ensuring combustor stability.

Combustor Tuning Period: The period, not to exceed 360 minutes, during which combustor tuning activities taking place.

Revised Conditions of Certification:

AQ-21 The owner/operator of the Gas Turbines (S-1 and S-3) and HRSGs (S-2 and S-4) shall meet all of the requirements listed in (a) through (h) below, except during a gas turbine start-up, or a gas turbine shutdown, a steam turbine cold start-up, or a combustor tuning period.

All other parts of this condition of certification remain unchanged.

AQ-22(b) The emission limitations specified in Condition 22(a) shall be valid for a period not to exceed 24-months from the end of the commissioning period. At such time the emission limitations specified in Condition 21(b) shall apply for all operating conditions except gas turbine start-up and shut down periods, steam turbine cold startups and combustor tuning periods, unless specific transient, non-steady state conditions are identified pursuant to Conditions 22(f) and (g).

All other parts of this condition of certification remain unchanged.

AQ-23 The pollutant emission rates from each of the Gas Turbines (S-1, and S-3) during a start-up or a shutdown or during a combustor tuning period shall not exceed the limits established below. Except for NOx emissions during steam turbine cold startups and gas combustor tuning periods (PSD)

	Start-Up	<u>Cold Startup or</u> <u>Combustor Tuning</u>		Shutdown
	(lb/start-up)	(lb/hr)	(lb/period)	(lb/shutdown)
Oxides of Nitrogen (as NO ₂)	240	<u>300</u>	<u>600</u>	20
Carbon Monoxide (CO)	2,514	<u>2,514</u>	<u>2,514</u>	44.1
Precursor Organic Compounds (as CH ₄)	48	<u>48</u>	<u>96</u>	8

All other parts of this condition of certification remain unchanged.

AQ-24No more than one of the Gas Turbines (S-1 and S-3) shall not be in start-up mode, supporting a steam turbine cold start-up, or undergoing combustor tuning at any point in time. The total number of hours during which the Gas Turbines

(S-1 and S-3) may be operated to support a steam turbine cold start-up or may undergo gas turbine combustor tuning shall not exceed 30 hours per year per gas turbinesimultaneously. (PSD)

Verification: As part of the semiannual Air Quality Reports, the owner/operator shall report any violations of this condition.

AQ-32 Total combined emissions from the Gas Turbines, HRSGs and Auxiliary Boiler (S-1, S-2, S-3, S-4, and S-5), including emissions generated during Gas Turbine start-ups, Gas Turbine shutdowns, Steam Turbine Cold Startups, Gas Turbine Combustor tuning activities, Auxiliary Boiler start-ups, and Auxiliary Boiler shutdowns, shall not exceed the following limits during any calendar day:

All other parts of this condition of certification remain unchanged.

AQ-33 Cumulative emissions from the Gas Turbines, HRSGs, and Auxiliary Boiler (S-1, S-2, S-3, S-4, and S-5), including emissions generated during Gas Turbine start-ups, Gas Turbine shutdowns, Steam Turbine Cold Startups, Gas Turbine Combustor Tuning Activities, Auxiliary Boiler start-ups, and Auxiliary Boiler shutdowns, shall not exceed the following limits during any consecutive twelve-month period:

All other parts of this condition of certification remain unchanged.

AQ-35 The owner/operator shall demonstrate compliance with conditions 15 through 18, 21(a) through 21(d), 23, 24, 26, 28(a) through 28(d), 32(a), 32(b), 33(a), and 33(b) by using properly operated and maintained continuous monitors (during all hours of operation including equipment startup and shutdown and Gas Turbine Combustor Tuning periods) for all of the following parameters:

All other parts of this condition of certification remain unchanged.

AQ-36 To demonstrate compliance with conditions 23, 32(c) through 32(e), and 33(c) through 33(e), the owner/operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass emissions, Fine Particulate Matter (PM₁₀) mass emissions (including condensable particulate matter), and Sulfur Dioxide (SO₂) mass emissions from each power train. The owner/operator shall use the actual Heat Input Rates calculated pursuant to condition 35, actual Gas Turbine Start-up Times, actual Gas Turbine Shutdown Times, actual Steam Turbine Cold Startup times, actual Gas Turbine Combustor Tuning Times and CEC and District-approved emission factors to calculate these emissions. The calculated emissions shall be presented as follows:

All other parts of this condition of certification remain unchanged.

AQ-44 The owner/operator shall maintain all records and reports on site for a minimum of 5 years. These records shall include, but are not limited to: continuous monitoring records (firing hours, fuel flows, emission rates, monitor excesses, breakdown, etc.), source test and analytical records, emission calculation

records, records of Steam Turbine Cold Startup and Gas Turbine Combustor Tuning activities, records of plant upsets and related incidents. The owner/operator shall make all record and reports available to District and the CEC CPM upon request. (Regulations 2-6-501)

All other parts of this condition of certification remain unchanged.

AQ-59 To demonstrate compliance with Condition AQ-24, the owner/operator shall record the start time, end time, and duration of each steam turbine cold start-up and each gas turbine combustor tuning period. On an annual basis, the owner-operator shall submit a report to the District and the CEC CPM describing the total number of hours during which each turbine was operated in support of a steam turbine cold start-up or combustor tuning mode during the year. (PSD)

Verification: As part of the Annual Air Quality Reports, the owner-operator shall include the total number of hours during which each turbine was operated in support of a steam turbine cold start-up or combustor tuning mode during the year.